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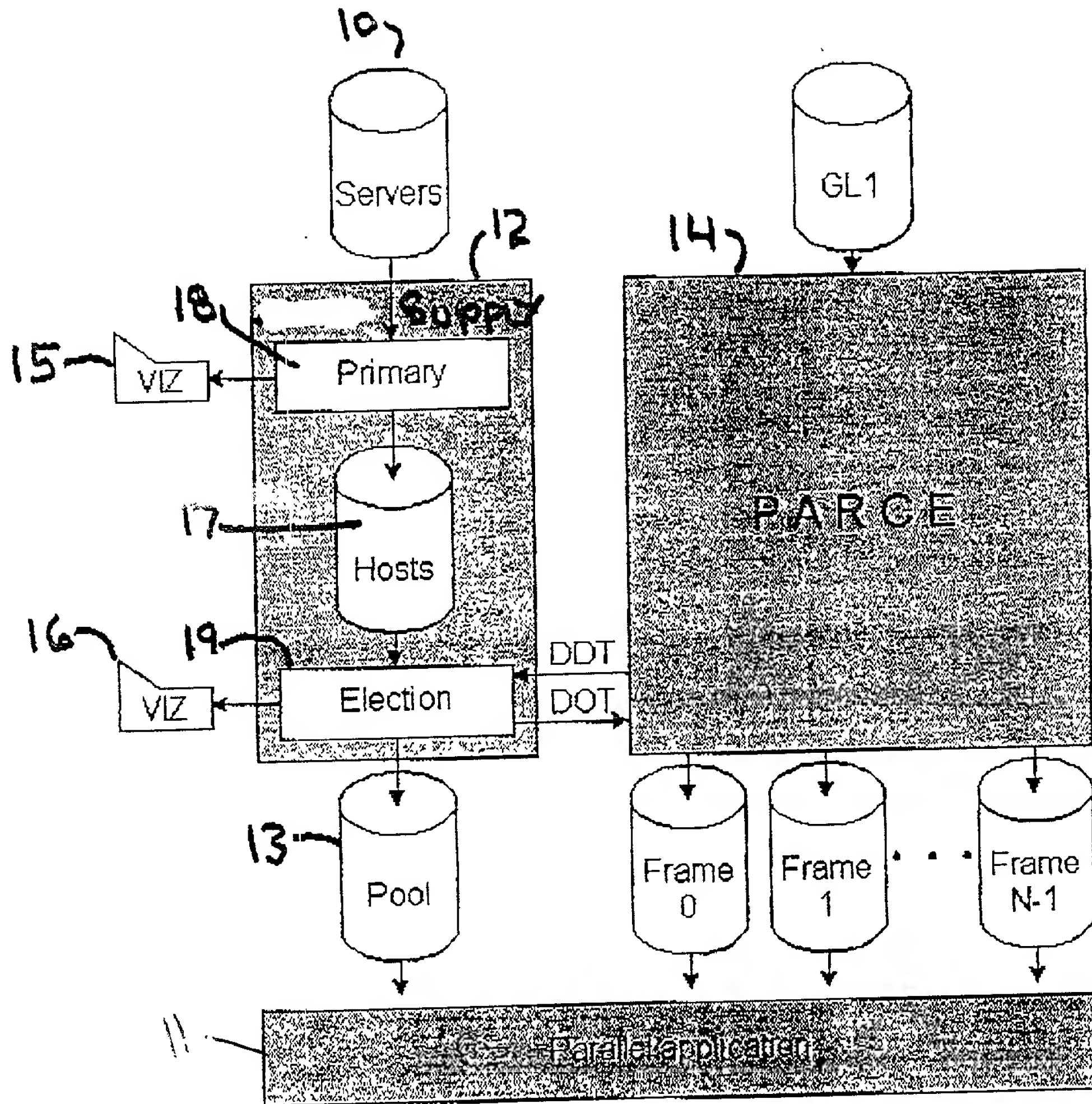


FIGURE 1

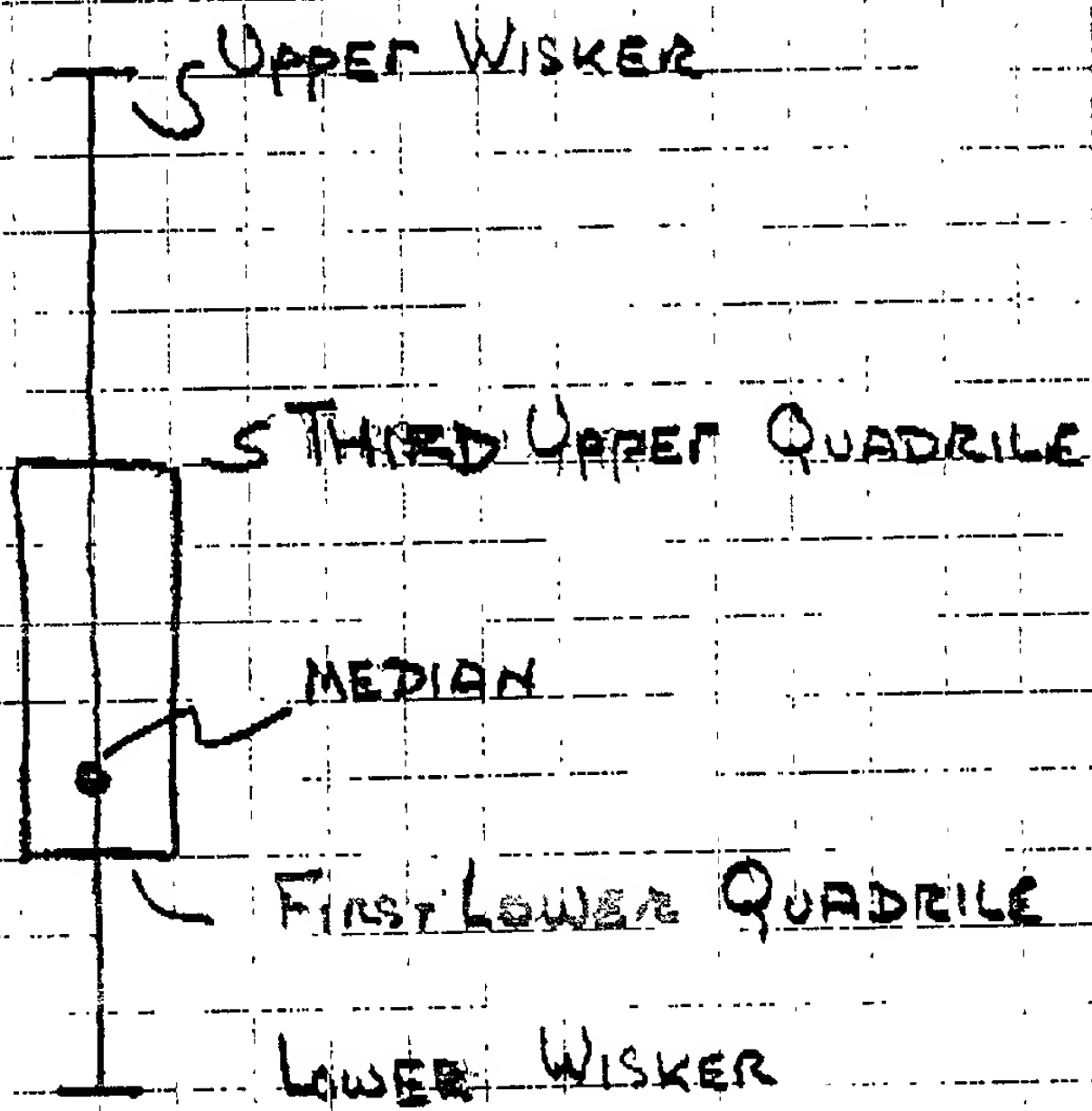
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FIGURE 2

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COST-OF-SUPPLY (SUPPLY)

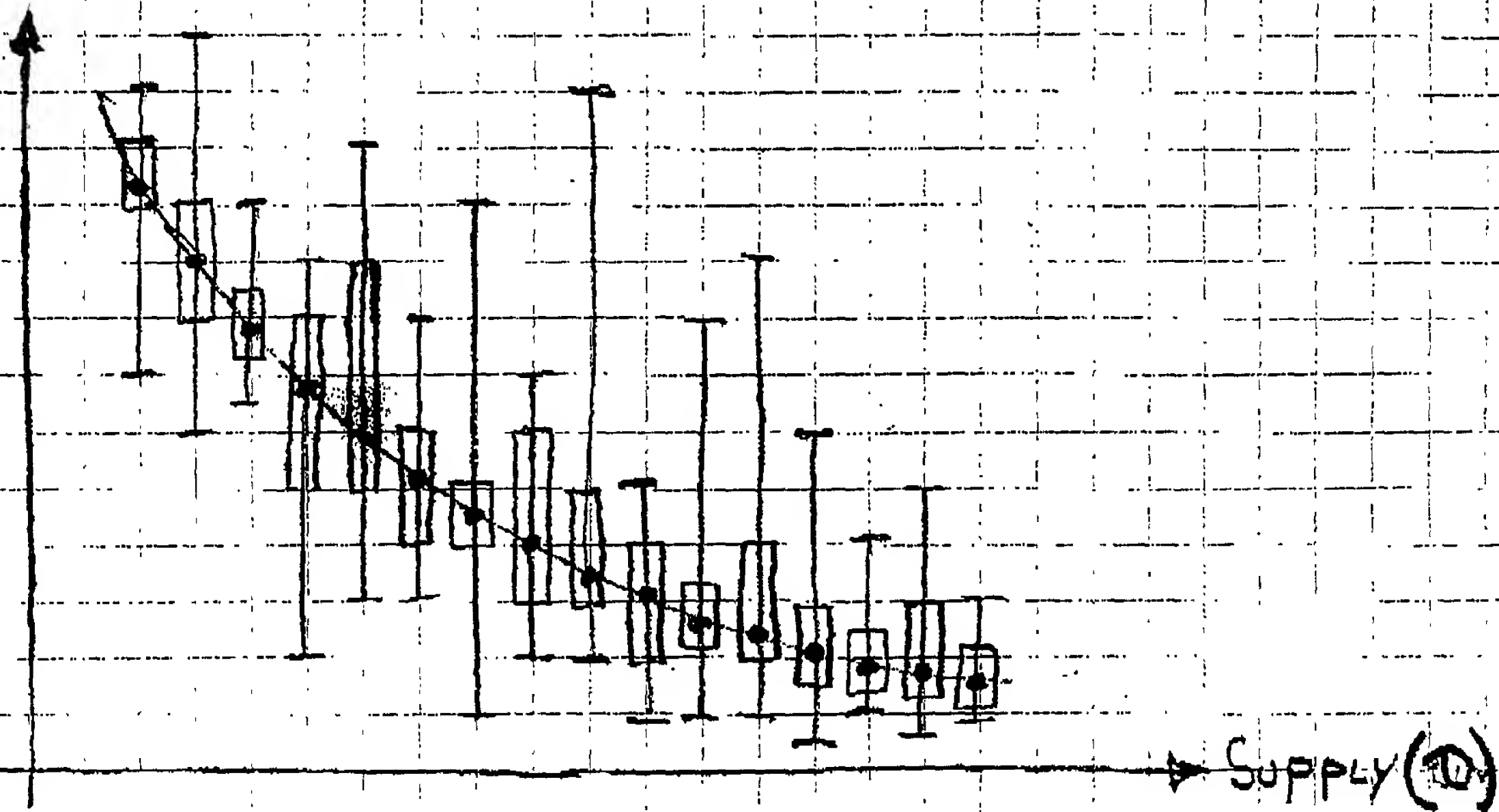


FIGURE 3

$$\text{Supply}(t) = \text{CAPACITY} - \text{UTILIZATION}(t)$$

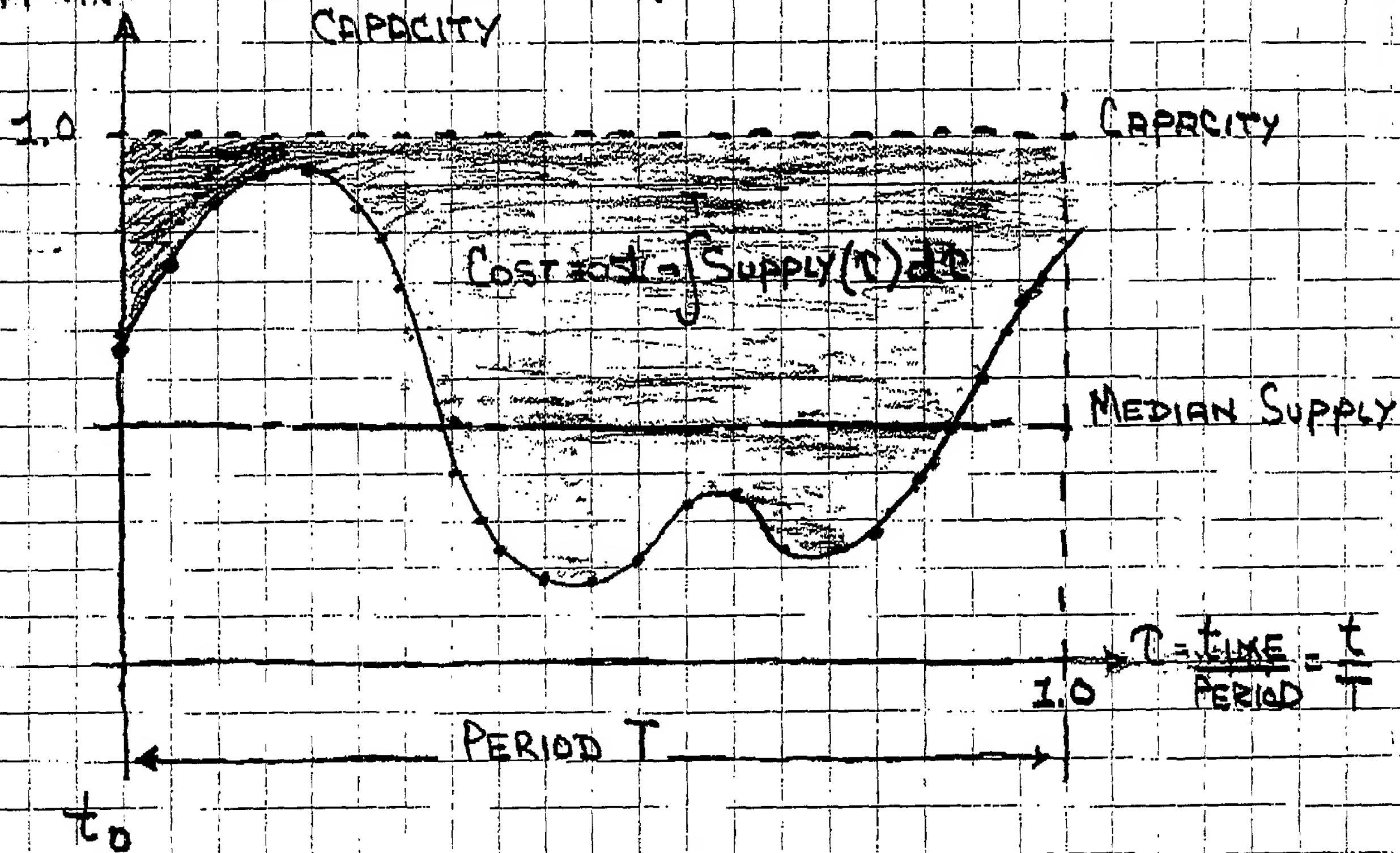


FIGURE 4

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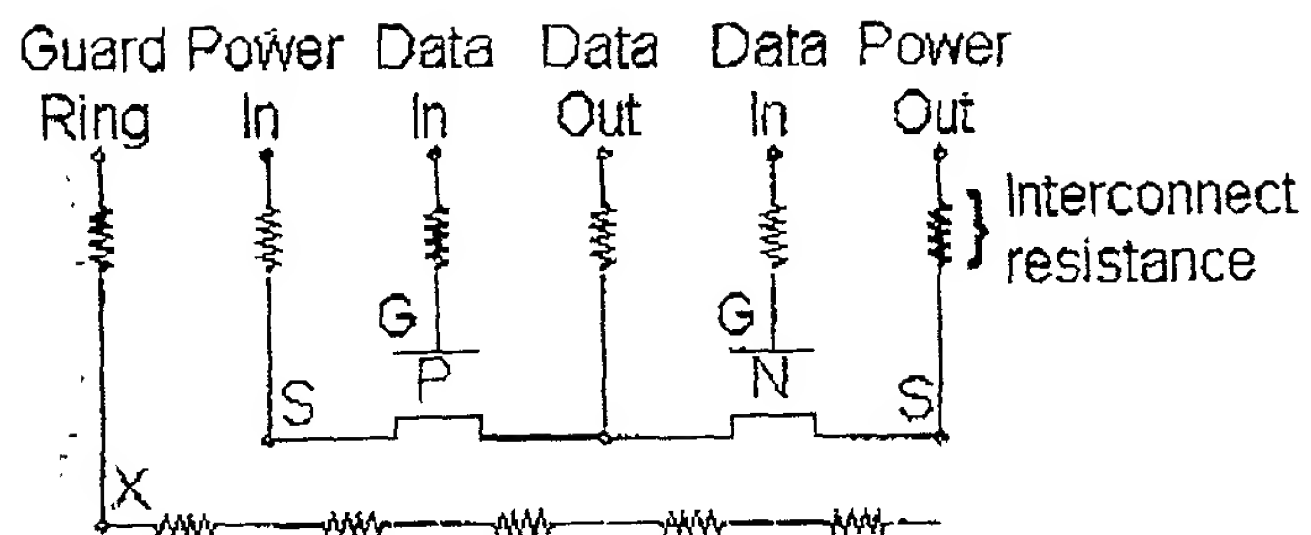
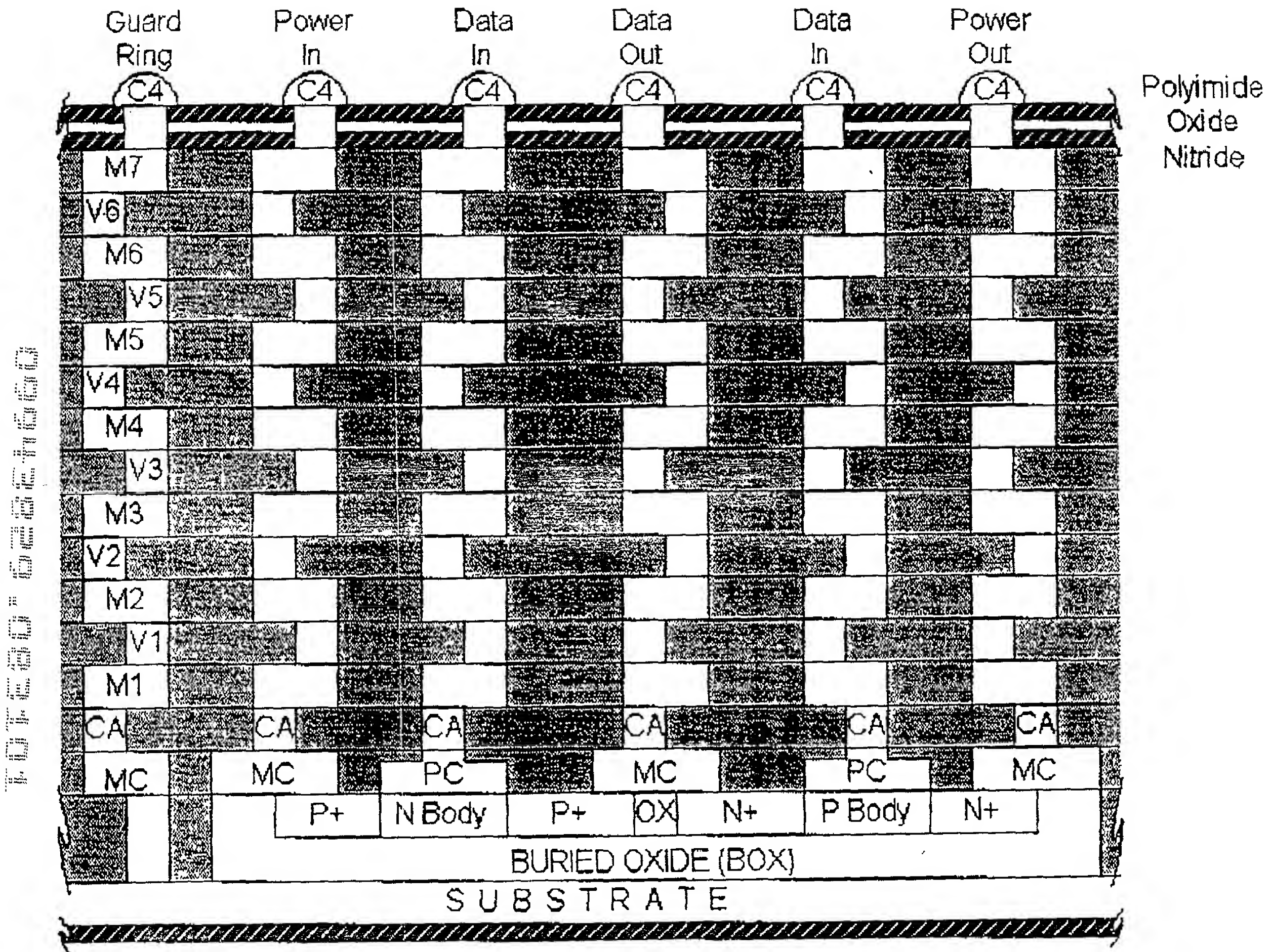


FIGURE 5

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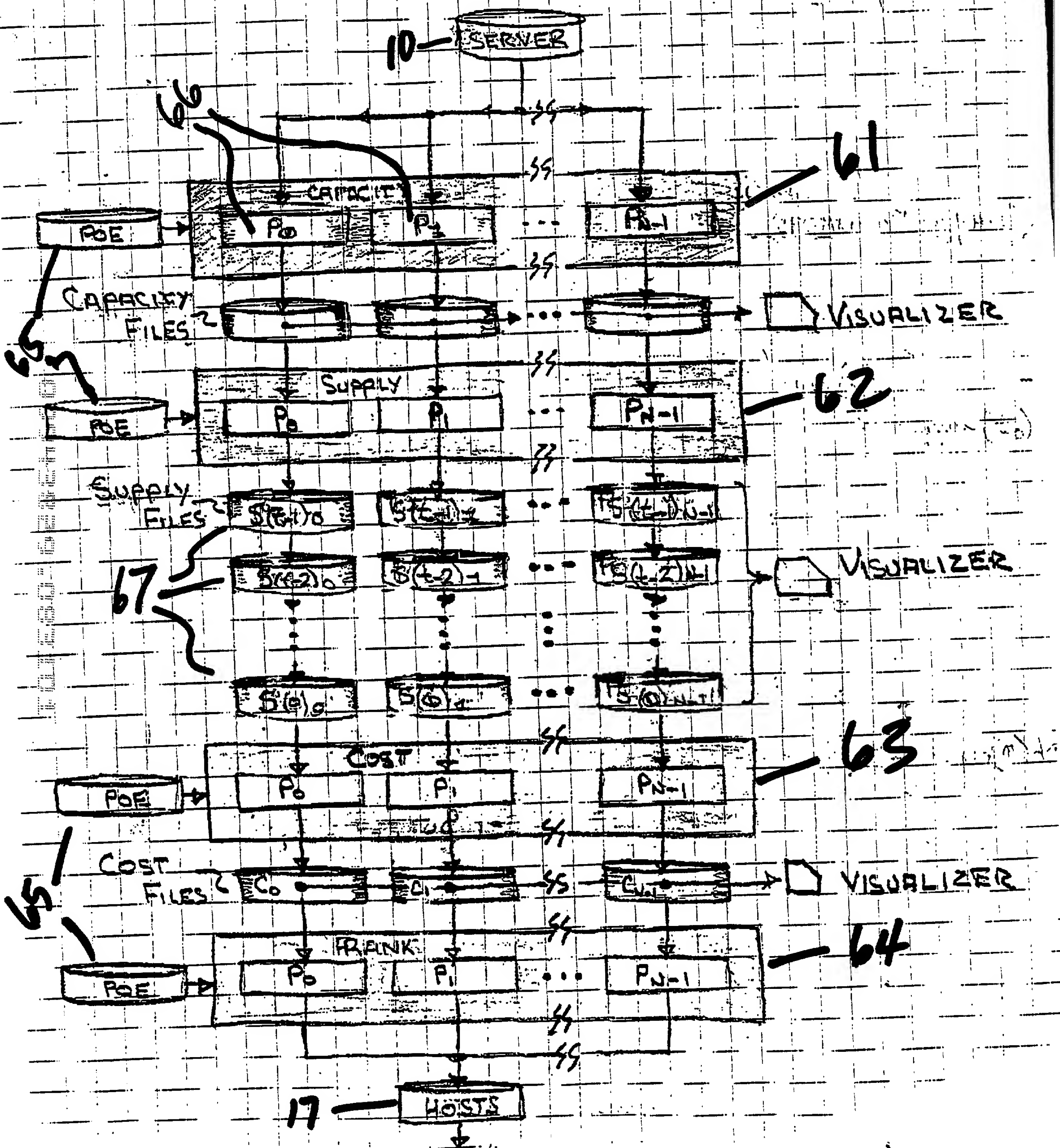


FIGURE 6

START

Hosts_i

Capacity_i

Utilization(t₀)_i

Supply(t₀)_i

t_i < T

Utilization(t_j)_i

Supply(t_j)_i

Cost(t_j)_i

Rank(t_j)_i

Hosts_i Where { Dimension: $0 \leq \text{Host}(i) \leq \text{Server}(N)$ [1]
Unit Scalar
Form: Time independent vector(i).
 $0 \leq i \leq M \leq N$

Capacity_i = {CPU, memory, temp file, cache page}, [2]
Where { Dimensions: CPU, data, data, data
Units: Scalar, byte, byte, byte
Form: Time independent, ix4 matrix

Utilization(t₀)_i = {CPU, mem, tmp, page}(t₀)_i [3]
Where { Dimensions: CPU, data, data, data
Units: Scalar, byte, byte, byte
Form: Time dependent, ix4 matrix

Supply(t₀)_i = Capacity_i - Utilization(t₀)_i [4]
Where { Dimensions: CPU, data, data, data
Units: Scalar, byte, byte, byte
Form: Time dependent, ix4 matrix

Where $0 \leq t_i \leq \text{Sampling period } T$

Utilization(t_j)_i

[3a]

Supply(t_j)_i = (Capacity_i - Utilization(t_j)_i) [4a]

Cost_i = $1 - \int \text{Supply}(t_j)_i dt_j$ [5a]

Where { Dimensions: None, none, none, none
Units: Scalar, scalar, scalar, scalar
Form: Time dependent vector (t_i)

Rank(t_j)_i = Sort[Value(t_j)_i]

[6a]

Supply(t_j)_i

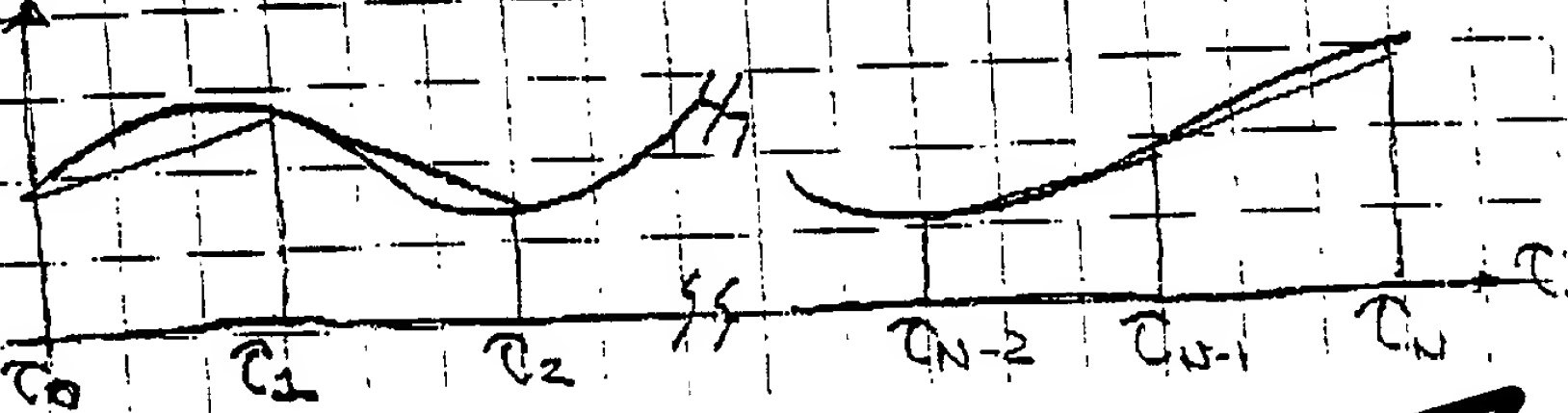


FIGURE 7

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CAPACITY

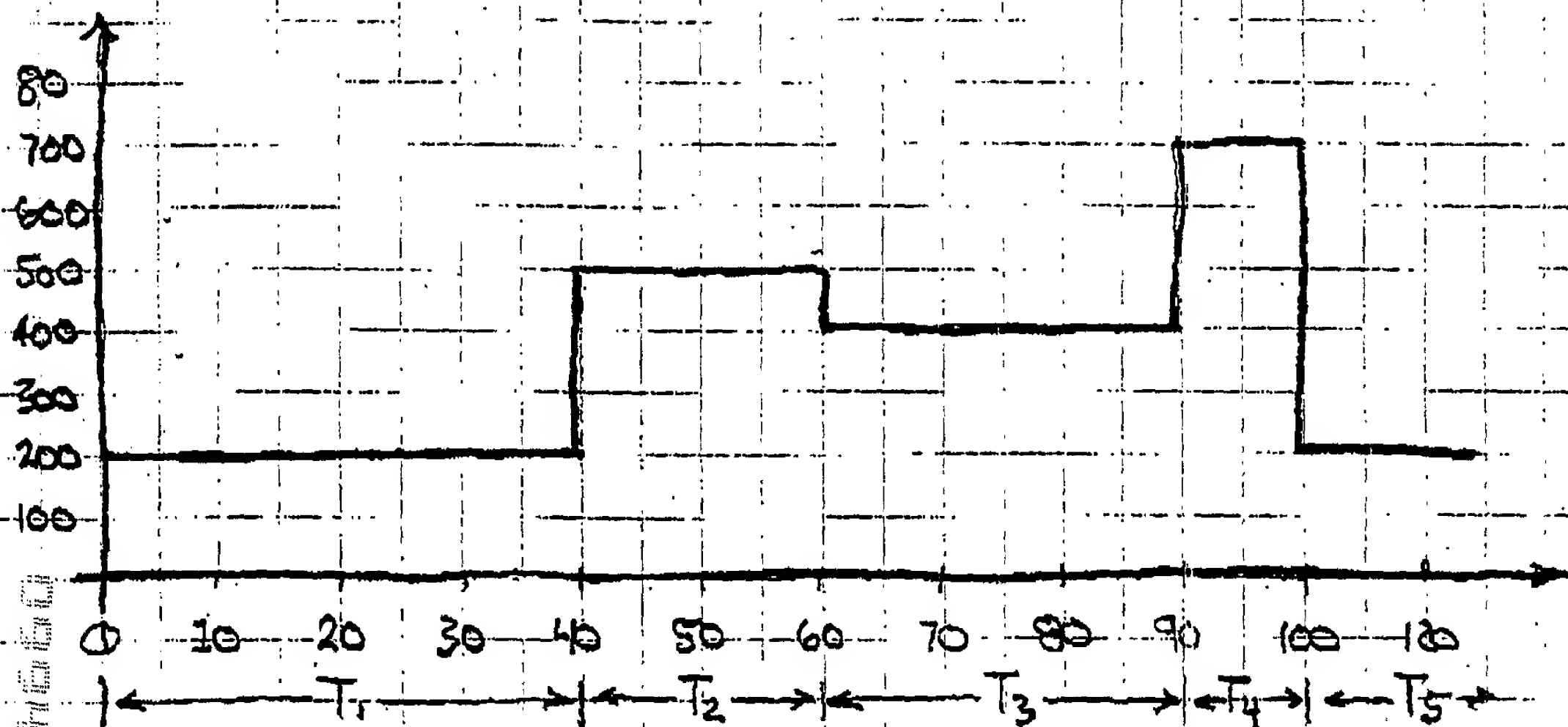


FIGURE 7A

CAPACITY

CAPACITY

200

1.0

150

0.75

100

0.5

50

0.25

10

20

30

40

TIME

0.5

1.0

$\tau = \frac{t}{T_1}$

$\frac{T_1}{2}$

$$\text{AREA} = \text{CAPACITY} \times T_1$$

$$= 200 \times 40 = 8000$$

$$\text{AREA} = \text{CAPACITY} \times T_1$$

$$= 1.0 \times 1.0 = 1.0$$

FIGURE 7B

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$$\text{Supply}(t) = \text{CAPACITY} - \text{UTILIZATION}(t)$$

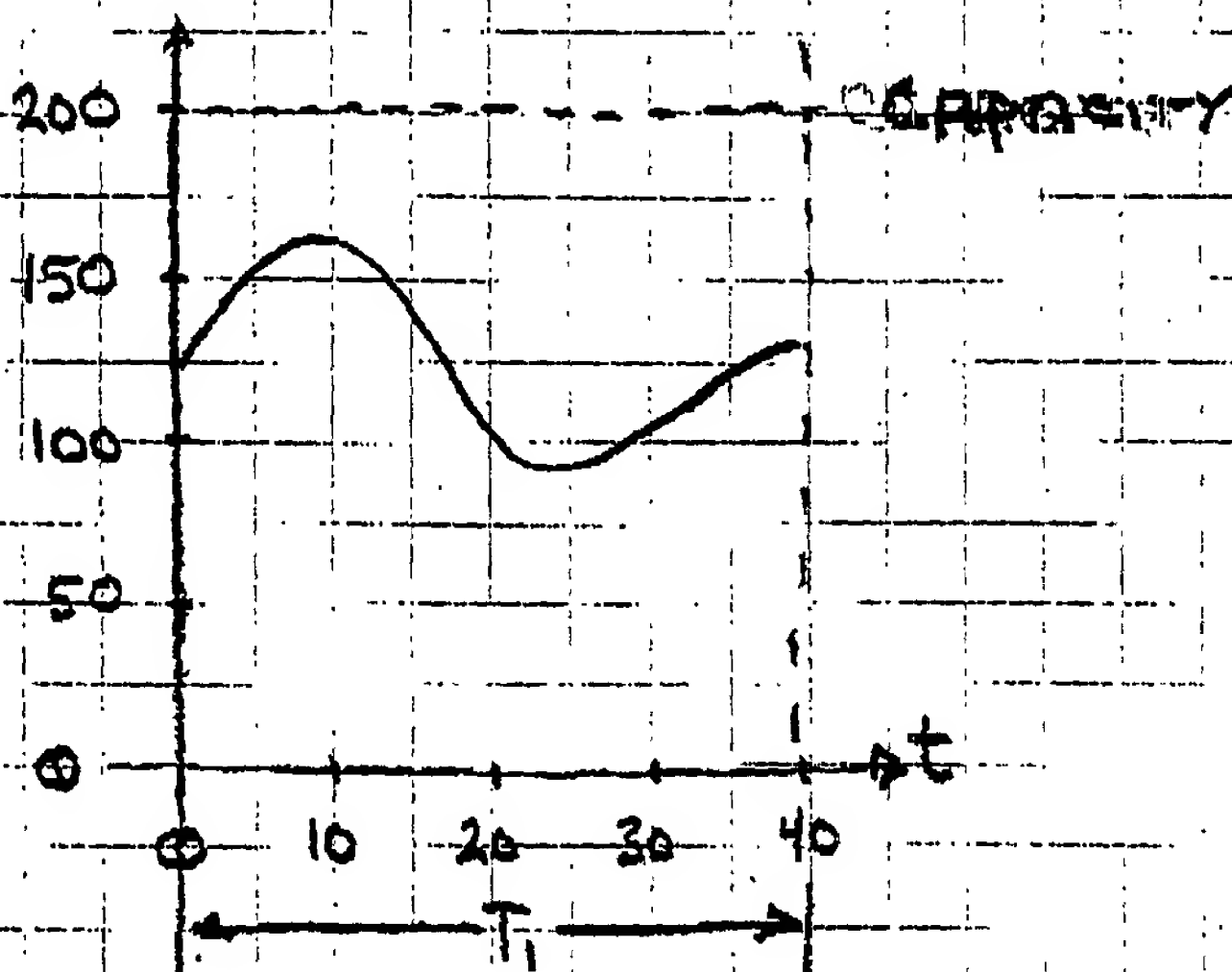


FIGURE 7C

$$\text{Supply}(\tau) = \text{CAPACITY} - \text{UTILIZATION}(\tau)$$

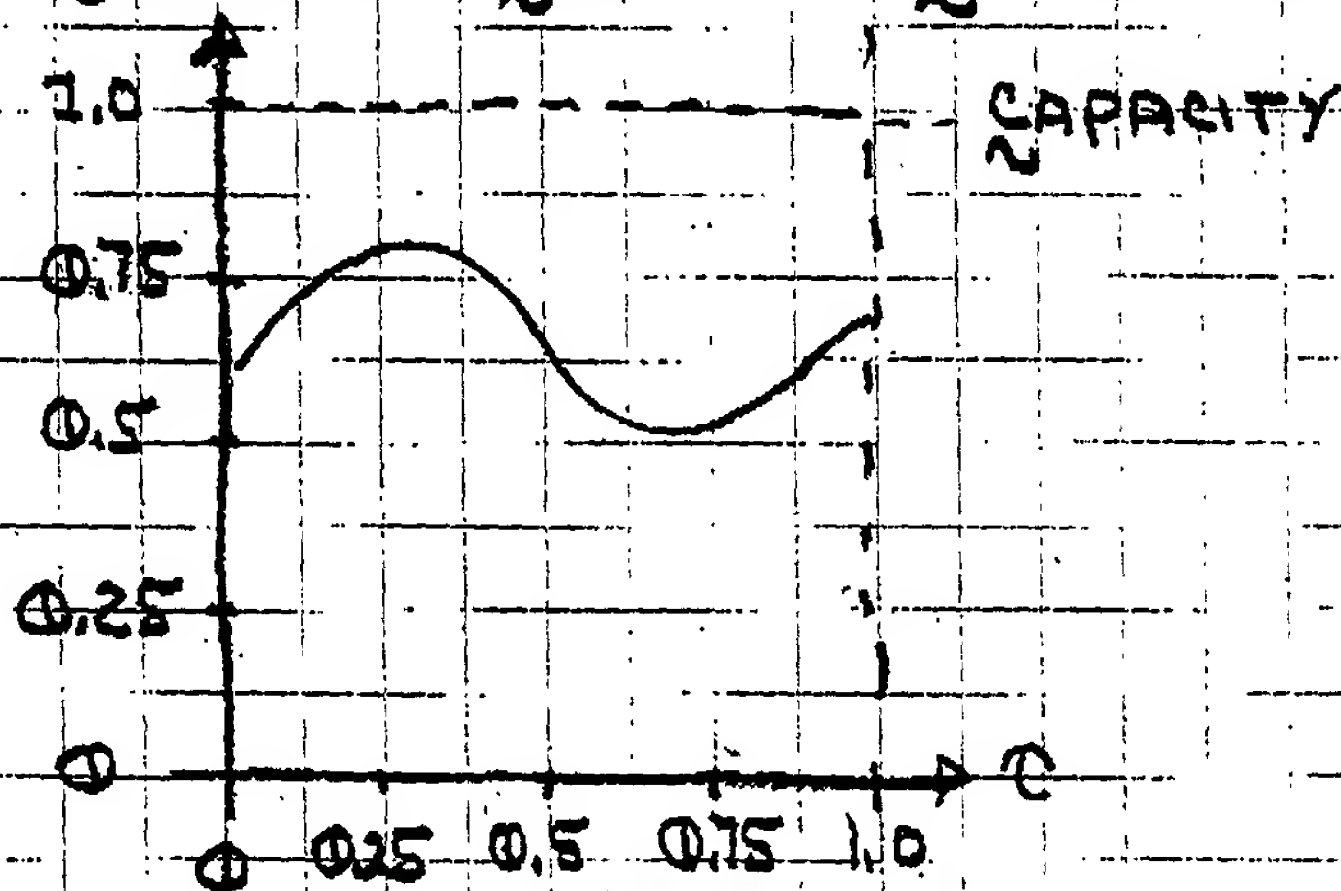


FIGURE 7D

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$$\frac{d \text{COST-OF-SUPPLY}(\tau)}{d\tau} \uparrow \Rightarrow \downarrow \text{SUPPLY}(\tau)$$

$$\text{COST-OF-SUPPLY} = \text{SUPPLY}(\tau)$$

$$\frac{d \text{COST-OF-SUPPLY}(\tau)}{d\tau} \downarrow \Rightarrow \uparrow \text{SUPPLY}(\tau)$$

FIGURE 7E

$\text{Supply}(\tau)$

1.0

CAPACITY

$$\text{COST-OF-SUPPLY} = 1 + \int \text{Supply}(\tau) d\tau$$

FIGURE 7F

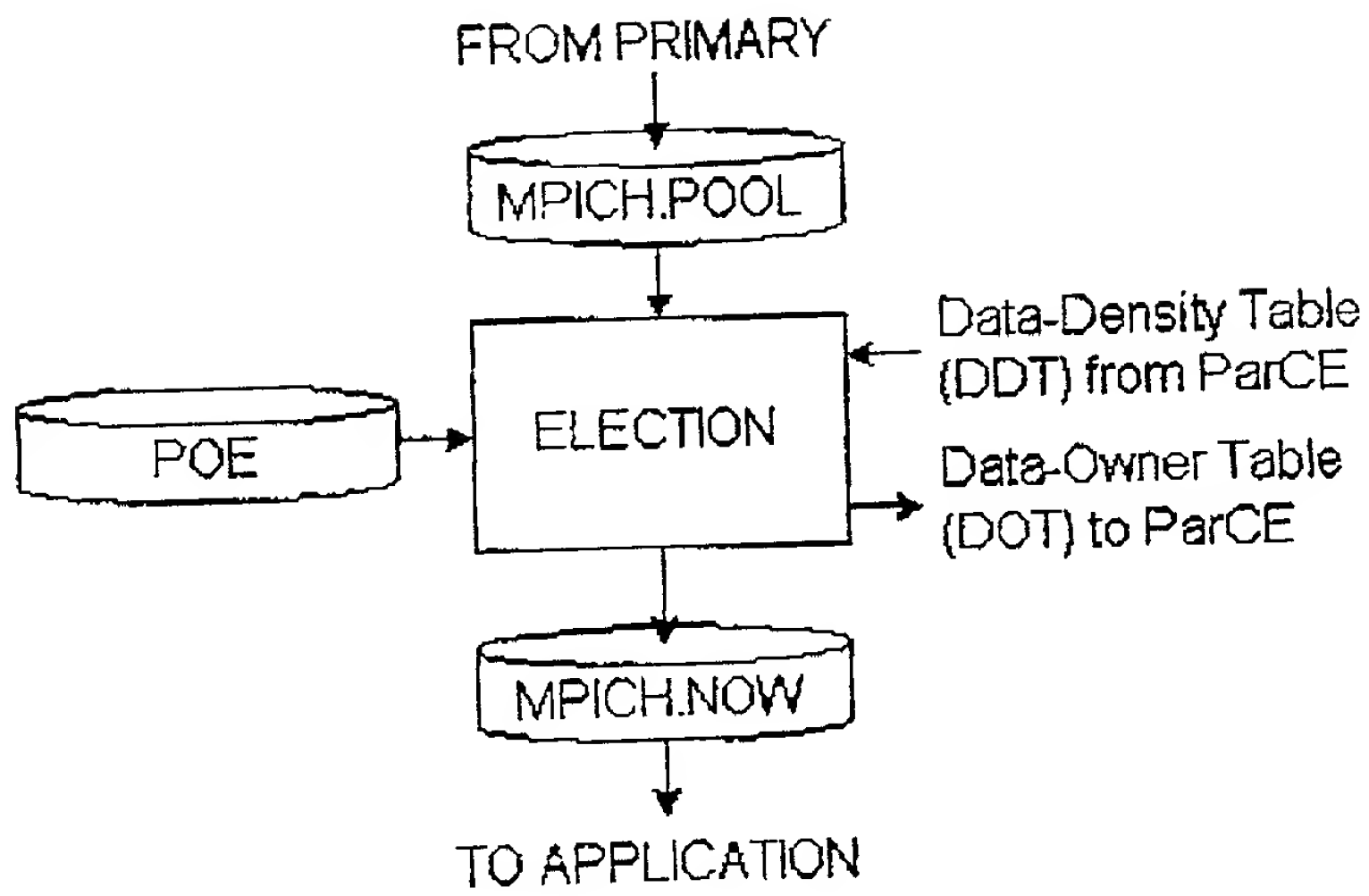


FIGURE 8

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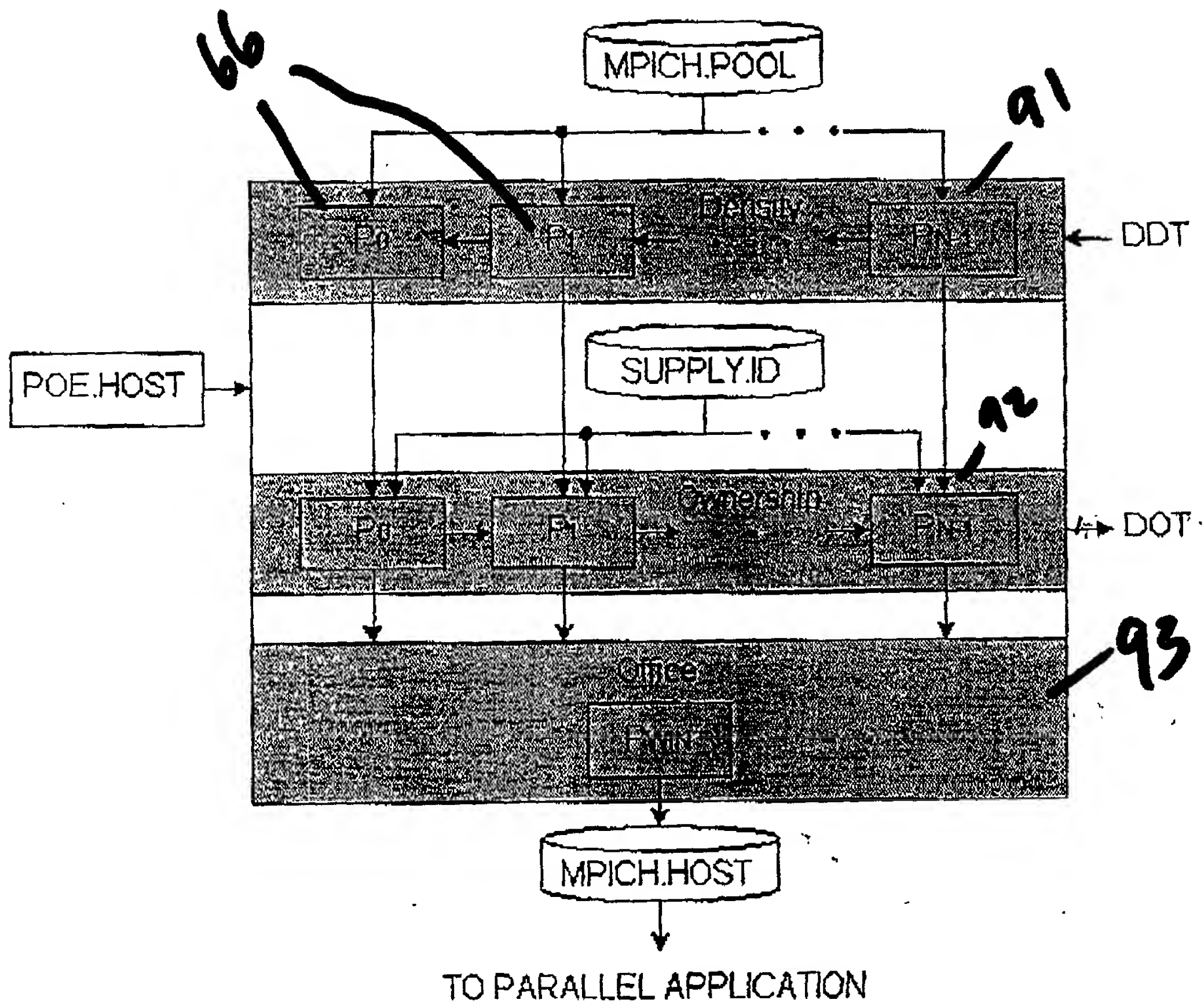


FIGURE 9

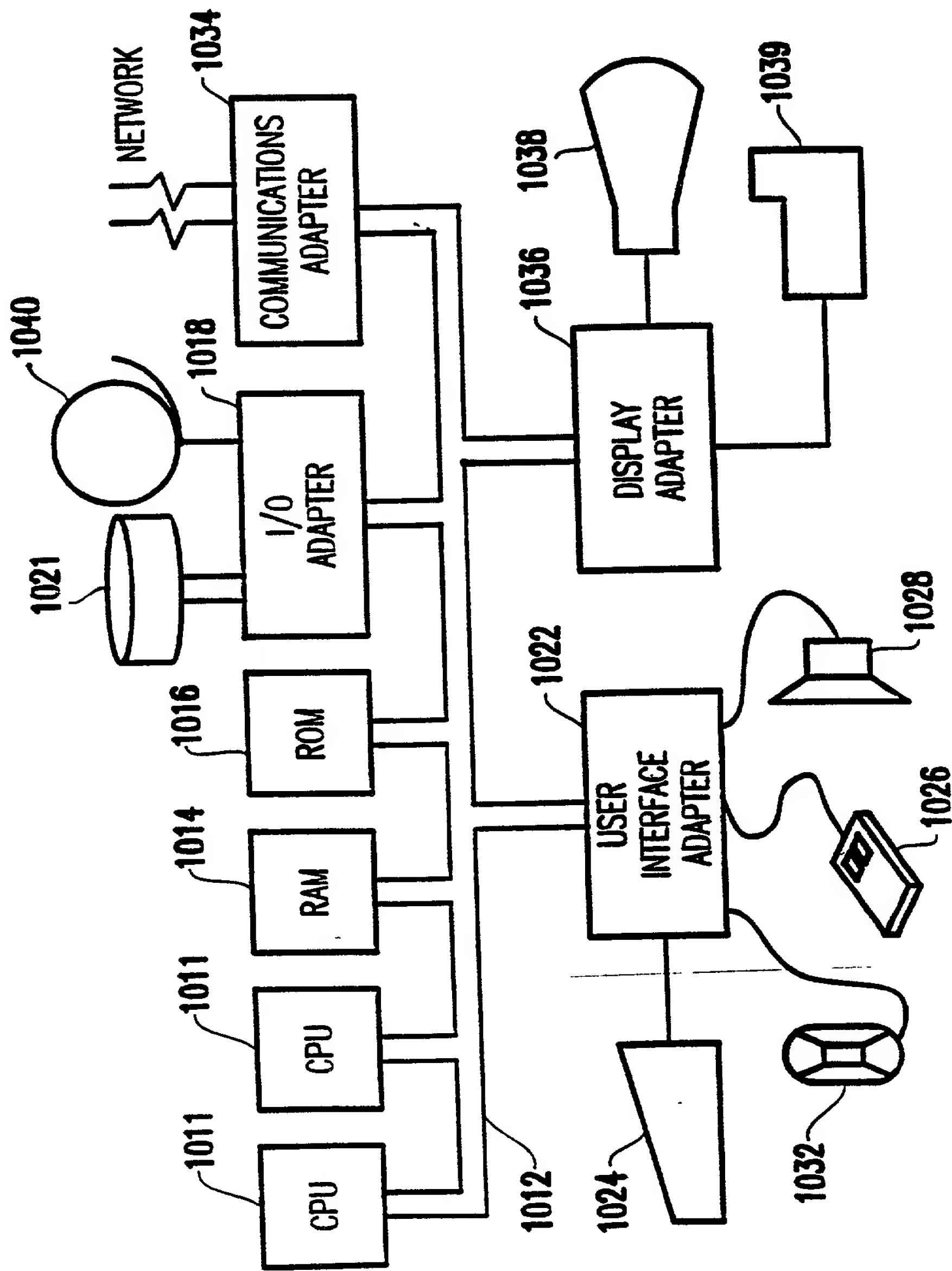


FIG. 10

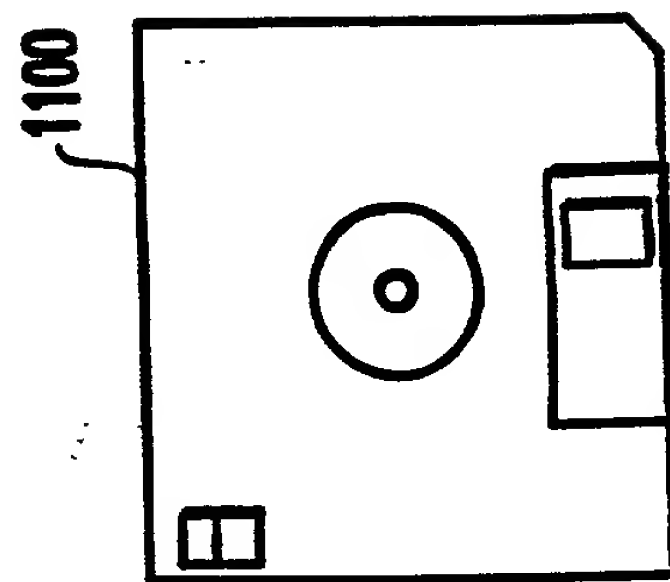


FIG. 11